

REMARKS

Claim 1 has been examined and stands rejected under 35 U.S.C. §112 as indefinite, under 35 U.S.C. §101 as claiming the same invention of Claim 1 of U.S. Pat. No. 6,616,853, and under 35 U.S.C. §102(b) as anticipated by C.M.A. Ashruf *et al.*, "Galvanic porous silicon formation without external contacts," Sensors and Actuators 74, 118 (1999) ("Ashruf").

Claim 1 has been amended and several claims added. The §112 and §101 rejections are moot in light of the amendments. While the §102 rejection is also believed to be moot in light of the amendments, Applicants offer the following remarks concerning Ashruf in the interest of advancing prosecution of the application.

Ashruf teaches a method for forming porous silicon that uses a galvanic cell formed by immersing an inert metal electrode connected to a silicon sample in a HF solution. The formation of the galvanic cell is desirable in Ashruf since the galvanic cell promotes oxygen-reduction reactions at the inert electrode that result in etching of the silicon sample to produce porous silicon. The rate at which porous silicon is formed is dependent on the current generated by the galvanic cell, so that more efficient formation of porous silicon results from a stronger galvanic cell. Ashruf further teaches the addition of oxidizing agents like $(\text{NH}_4)_2\text{S}_2\text{O}_8$ or H_2O_2 to further increase the efficiency of forming porous silicon by increasing the concentration of oxygen in the cell. The addition of a surfactant like Triton X-100 is disclosed for the purpose of preventing the formation of large hydrogen bubbles. There is no recognition in Ashruf of any effect that the surfactant may have on leaching of dopants from the silicon.

The claims are directed to a completely different application than the formation of porous silicon; they are instead directed to fabricating a microelectromechanical system. In the recited method, an intermediate microstructure is produced that includes a doped structural film, sacrificial material, and metallic material. The sacrificial material is dissolved with an acid to form the microelectromechanical system. The formation of a galvanic cell is a byproduct rather than a goal of this process — the acid is used to dissolve the sacrificial material and the

formation of a galvanic cell is a consequence of the presence of the other materials. Indeed, the formation of the galvanic cell is undesirable because of the resultant leaching that occurs from the doped structural film (*see, e.g.*, Application, p. 4, ll. 16 – 28). The resulting surface roughness on the structural film, which remains part of the microelectromechanical system after dissolving the sacrificial material, is undesirable and may be detrimental to the operation of the microelectromechanical system.

This is exactly opposite to Ashruf, which seeks to promote the effects that produce surface roughness in trying to form porous silicon. Ashruf thus neither teaches nor suggests producing an intermediate structure that includes a doped structural film, sacrificial material, and metallic material. Nor does it teach or suggest dissolving the sacrificial material to form the microelectromechanical system. Since these limitations are not disclosed in Ashruf, it does not anticipate the claims.

While not directly relevant to a §102 analysis, Applicants additionally note that Ashruf teaches away from the claims. While the claims recite the inclusion of a substance to suppress dopant leaching, Ashruf teaches the addition of substances designed to increase the etching rate of the silicon. Ashruf's specific teaching of using Triton-X, without any recognition that it may suppress dopant leaching or suppress the effects of the galvanic cell, in a process designed to enhance the silicon etching rate, is a teaching decisively away from what is claimed ("A reference may be said to teach away when a person of ordinary skill, upon reading the reference, ... would be led in a direction divergent from the path that was taken by the applicant," *In Re Gurley*, 31 USPQ2d 1130, 1132 (Fed. Cir. 1994)). Ashruf thus clearly corroborates the assertion in the application that the discovery of this effect was unexpected (*see* Application, p. 4, ll. 30 – 32).

Appl. No. 10/632,698
Amdt. dated June 21, 2004
Reply to Office Action of March 30, 2004


PATENT

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 303-571-4000.

Respectfully submitted,


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